

**Abstract of the Disclosure**

Provided are systems and methods for precisely measuring birefringence properties of optical elements, especially those elements that are used in deep ultraviolet (DUV) wavelengths. The system includes two photoelastic modulators (PEM) (126, 128) located on opposite sides of the sample (136). Each PEM is operable for modulating the polarity of a light beam that passes through the sample. The system also includes a polarizer (124) associated with one PEM, an analyzer (130) associated with the other PEM, and a detector (132) for measuring the intensity of the light after it passes through the PEMs, polarizer, and analyzer. Described are techniques for determining birefringence properties across a wide range. For example, a dual-wavelength source light embodiment is provided for measuring relatively high levels of birefringence. Also provided is a technique for selecting the most accurate and efficient one of a number of approaches to determining birefringence properties depending upon the estimated value of the birefringence to be detected for a given sample optical element.